XXXVI. *Astronomical Observations made at the* North Cape, *for the Royal Society. By Mr.* Bayley.

1769 April 28, 29, and 30, got the observatory and dwelling-house built, and instruments on shore.

☽ May 1 Set up an oak plank $4\frac{3}{4}$ inches thick, and 14 inches wide. This plank was set a little more than 2 feet in the ground, and well rammed with earth and stones so that it was very steady and firm; to which I screwed the astronomical clock truly perpendicular (by which means it was independant of the observatory and its shaking by the wind) and set it going nearly with sidereal time.

☿ 3 Set up the transit instrument nearly in the meridian.

♃ 4 Examined the line of collimation of the quadrant, and found it correct.

Examined the clock, and found the pendulum to vibrate $1^{\circ}\frac{1}{2}$ on each side of nothing.

Here follow some corresponding altitudes of the Sun, from which the going of the clock is determined.

		′ ″	h ′ ″	′ ″			Z. D. ° ′
♄	6	27 13	23 34 37	42 22	Morning	Sun's upper limb	61,30
		20 58	6 13 30	5 48	Afternoon		
		5 57	0 14 31	23 8	Morning	Sun's upper limb	50,0
		42 6	5 33 32	24 55	Afternoon		
☉	7	29 16:	0 38 39:	48 24:	Morning	Sun's upper limb	57,36 very hazy
		26 24:	5 16 59:	– – –	Afternoon		
		39 20:	0 49 17:	59 44:	Morning	Sun's lower limb	
		16 18:	– – – – – –	– – –	Afternoon		
☽	8	29 53	23	44 29	Morning	Sun's upper limb	61,20
		34 0	6	19 25	Afternoon		
		37 39	23 45 13	– – –	Morning	Sun's lower limb	
		26 16	6 18 44	– – –	Afternoon		
♄	13	26 46	21 33 0	38 59	Morning	Sun's upper limb	71,20
		33 23	39 35	45 34	Afternoon		

This day set up a meridian post nearly in the meridian, by help of the quadrant, at about half a mile from the observatory. Examined the pendulum of the clock, and found it to vibrate $1^{\circ}\frac{1}{2}$ on each side of nothing.

☽	15	– – –	1 9 25	18 54	Morning	Sun's upper limb	55,40
		– – –	5 49 26	39 54	Afternoon		
		9 59	1 19 46	– – –	Morning	Sun's lower limb	
		48 48	5 39 0	– – –	Afternoon		
♃	18	48 56	21 55 4	1 8	Morning	Sun's upper limb	70,5
		55 31	22 1 42	– – –	Afternoon	Sun's lower limb	
♄	20	– – –	1 36 21	46 20	Morning	Sun's upper limb	54,12
		– – –	6 1 48	51 50	Afternoon		
		37 3	1 47 16	– – –	Morning	Sun's lower limb	
		1 10	5 50 56	– – –	Afternoon		

Correſponding Altitudes of the SUN.

1769		′ ″	h ′ ″	′ ″			Z. D. ° ′
☉	21	— — —	22 6 2	12 6	Morning	Sun's upper limb	69,27
		6 28	12 38	— — —	Morning	Sun's lower limb	
♀	26	At 7^h 22′ per clock, clock ſtopped, but by what cauſe I cannot find, it not being down. At 9½ ſet it going again, as near as I could gueſs, with ſidereal time. Pendulum vibrates 1°½ on each ſide of nothing.					
♃ June	1	Wound up the clock. The pendulum vibrates 1°½ on each ſide of nothing.					
♄	3	49 45	22 55 59	2 3	Morning	Sun's upper limb	67,40
		— — —	10 34 52	28 47	Afternoon	Sun's upper limb	
		56 23	23 2 34	— — —	Morning	Sun's lower limb	
		34 28	10 28 14	— — —	Afternoon	Sun's lower limb	
		— — —	23 6 16	12 19	Morning	Sun's upper limb	66,50
		— — —	10 24 31	18 26	Afternoon	Sun's upper limb	
		6 40	23 12 53	18 51	Morning	Sun's lower limb	
		24 4:	10 17 52:	11 56	Afternoon	Sun's lower limb	
		— — —	23 49 31	55 38	Morning	Sun's upper limb	63,20
		— — —	9 41 12:	35 5:	Afternoon	Sun's upper limb	
		49 56	23 56 14	02 18	Morning	Sun's lower limb	
		40 47:	9	28 24:	Afternoon	Sun's lower limb	
		— — —	0 7 30	13 42	Morning	Sun's upper limb	61,54
		— — —	9 23 13:	17 2:	Afternoon	Sun's upper limb	
		7 55	14 16	20 30	Morning	Sun's lower limb	
		22 48:	9 16 26:	10 12:	Afternoon	Sun's lower limb	
		— — —	0 48 51	55 26	Morning	Sun's upper limb	58,42
		— — —	8 41 50	35 13	Afternoon	Sun's upper limb	
		49 19	0 56 2	— — —	Morning	Sun's lower limb	
		— — —	8 34 37	— — —	Afternoon	Sun's lower limb	
		— — —	1 16 46	23 47	Morning	Sun's upper limb	56,40
		— — —	8 13 51	6 50	Afternoon	Sun's upper limb	
		17 14	1 24 26	— — —	Morning	Sun's lower limb	
		13 23	8 6 11	— — —	Afternoon	Sun's lower limb	
		— — —	1 39 55	47 29	Morning	Sun's upper limb	55,5
		— — —	7 50 41	— — —	Afternoon	Sun's upper limb	
		41 27	1 48 11	— — —	Morning	Sun's lower limb	
		— — —	7 42 29::	— — —	Afternoon	Sun's lower limb	
		— — —	2 13 44	22 27	Morning	Sun's upper limb	53,0
		— — —	7 16 52	8 7	Afternoon	Sun's upper limb	
		14 18	2 23 19	— — —	Morning	Sun's lower limb	
		16 18	7 7 18	— — —	Afternoon	Sun's lower limb	
		— — —	2 30 20	39 56	Morning	Sun's upper limb	52,5
		— — —	7 0 16	50 39	Afternoon	Sun's upper limb	
		30 56	2 40 52	51 8	Morning	Sun's lower limb	
		59 40	6 49 45	39 24	Afternoon	Sun's lower limb	
		— — —	2 56 16	7 58	Morning	Sun's upper limb	50,50
		— — —	6 34 20	— — —	Afternoon	Sun's upper limb	
		57 2	3 9 6	— — —	Morning	Sun's lower limb	
		33 33	6 21 31	— — —	Afternoon	Sun's lower limb	
♃	8	at	11 15 52,5	a mean of four obſervations Z. D. ☉ L. L. = 69° 26′ 15″			
♀	9	— — —	23 21 46	27 57	Morning	Sun's upper limb	67,0
		— — —	10 58 14:	52 6:	Afternoon	Sun's upper limb	
		22 11	23 28 26	— — —	Morning	Sun's lower limb	
		57 49:	10 51 39:	— — —	Afternoon	Sun's lower limb	

1769 Corresponding Altitudes of the SUN.

1769	′ ″	h ′ ″	′ ″			Z. D. ° ′	
♀ June 9	33 43	23 0 0	46 0	Morning	Sun's upper limb	65,32	
	46 18	10 40 9	34 0	Afternoon			
	40 16	23 46 34	– – –	Morning	Sun's lower limb		
	39 45	10 33 27	– – –	Afternoon			
	– – –	1 28 43	– – –	Morning	Sun's upper limb	57,0	
	– – –	8 51 10	– – –	Afternoon			
	29 12	1 36 9	42 56	Morning	Sun's lower limb		
	50 40	8 43 42	36 54	Afternoon			
♄ 10	– – –	23 28 22	34 32	Morning	Sun's upper limb	66,44	
	– – –	10 56 36	– – –	Afternoon			
	28 45	23 34 56	– – –	Morning	Sun's lower limb		
	0 0	11 0 0	– – –	Afternoon			
	– – –	0 59 30	5 50	Morning	Sun's upper limb	59,26	
	– – –	9 28 43	22 22	Afternoon			
	59 56	1 6 27	– – –	Morning	Sun's lower limb		
	– – –	9 21 44	– – –	Afternoon			
	– – –	1 20 57	27 32	Morning	Sun's upper limb	57,48	
	– – –	9 7 16	– – –	Afternoon			
	21 26	1 28 12	– – –	Morning	Sun's lower limb		
	6 47	9 0 0	– – –	Afternoon			
☿ 14	– – –	1 42 4	48 39	Morning	Sun's upper limb	57,30	
	– – –	9 27 34	21 1	Afternoon			
	42 31	1 49 18	– – –	Morning	Sun's lower limb		
	27 8	9 20 20	– – –	Afternoon			
	– – –	2 9 8	16 15	Morning	Sun's upper limb	55,32	
	– – –	9 0 28	– – –	Afternoon			
	9 38	2 16 58	24 8	Morning	Sun's lower limb		
	0 0	9 0 0	– – –	Afternoon			
	– – –	3 24 23:	34 14:	Morning	Sun's upper limb	50,54	hazy
	– – –	45 8:	35 15:	Afternoon			
	25 6:	3 35 12:	45 48:	Morning	Sun's lower limb		
	44 23:	7 34 16:	23 38:	Afternoon			
☉ 18	17 16	0 23 28	29 30	Morning	Sun's upper limb	64,36	
	17 13	11 11 3	4 58	Afternoon			
	23 50	0 30 6	36 8	Morning	Sun's lower limb		
	10 40	11 4 2	58 20	Afternoon			
	– – –	0 39 11	45 17	Morning	Sun's upper limb	63,20	
	– – –	0 0 0	49 16::	Afternoon			
	39 37	0 45 51	– – –	Morning	Sun's lower limb		
	– – –	10 48 43::	– – –	Afternoon			
	– – –	2 22 1	29 5	Morning	Sun's upper limb	55,25	
	– – –	9 12 22	5 24	Afternoon			
	22 30	2 29 49	– – –	Morning	Sun's lower limb		
	11 54	9 0 0	– – –	Afternoon			
	– – –	3 32 20	41 56	Morning	Sun's upper limb	51,3	
	– – –	8 2 7	52 26	Afternoon			
	32 58	3 42 50	53 6	Morning	Sun's lower limb		
	1 27	7 51 35	41 20	Afternoon			

From the above correſponding Altitudes the going of the Clock is determined.

	Apparent noon per clock, per equal altitudes. h ′ ″	Clock too ſlow for ſidereal time. ′ ″	Rate of clock with reſpect to ſidereal time. ″	
May 6	2 53 31,0	1 1,0	+4,6	
8	3 1 25,2	0 52,3	+1,2	
15	3 28 59,2	0 43,2	—1,3	
20	3 48 43,9	0 49,6		Clock ſtopped.
♄ June 3	4 45 5,1	1 13,6	—0,5	
9	5 9 46,4	1 16,6	+1,3	
10	5 13 56,9	1 15,3	+2,1	
11	5 18 7,3	1 13,2	—0,2	
15	5 34 42,5	1 14,0	+0,07	
18	5 47 10,3	1 14,2		
		Mean rate of clock	+0,91	

TRANSITS taken with a Tranſit Inſtrument over the Meridian, on the Iſland of Maggerœ, or the North Cape of Europe.

1769

♄ May 20 | 3^h 49′ 30″,7 tranſit of Sun's center at tranſit inſtrument, it being adjuſted to the meridian mark, which was put nearly in the meridian. ——— And 3^h 48′ 43″,9 apparent noon per equal altitudes. By this it appears, the meridian mark is weſt of the true meridian.

☉ 21 | Shifted the meridian mark nearer to the true meridian.

		1 Wire. ′ ″	2 Wire. ′ ″	3 Wire. h ′ ″	4 Wire. ′ ″	5 Wire. ′ ″	
♄	June 3		43 $11\frac{1}{2}$	4 44 $1\frac{1}{2}$			☉ 1 L.
				46 17	47 $7\frac{1}{2}$		☉ 2 L.
♀	9			5 10 58,6			☉ 2 L. paſſed the merid.
		$11\frac{5}{8}$	27 8+	18 28 5—	29 2—	58—	α Lyræ.
		59—	$43\frac{5}{8}$	19 38 28+	$13\frac{3}{8}$	58	α Aquilæ.
♄	10	47 8	47 54	10 48 39	49 $24\frac{1}{2}$		☽ 1 L.
				12 45 14			Polaris S. P.
		32 v	19—	14 4 6—	$53\frac{1}{2}$		Arcturus.
		14 v	11—	18 28 7+	4+	$0\frac{5}{8}$	α Lyræ.
☉	11	15 24—	16 12+	5 17 $0\frac{1}{2}$			☉ 1 L.
				19 $18\frac{1}{2}$	20 $7\frac{5}{8}$	20 $55\frac{1}{2}$	☉ 2 L.
♃	15		32 $46\frac{1}{2}$	5 33 $34\frac{1}{2}$			☉ 1 L.
				35 53+	36 $41\frac{1}{2}$		☉ 2 L.
♀	16	17 52+	18 39—	4 19 26—	20 13+		♀ 2 L.
♄	17	40 18	41 6+	5 41 54+			☉ 1 L.
				44 $15\frac{1}{2}$:	45 $2\frac{1}{2}$	45 $50\frac{5}{8}$	☉ 2 L.
		33+	3 $20\frac{1}{2}$	14 4 $7\frac{1}{2}$	4 55		Arcturus.
		42 22+	43 11—	17 43 59+			☉ 1 L.
				46 $17\frac{1}{2}$	47 $5\frac{5}{8}$	47 54+	☉ 2 L.
		26 14	27 11	18 28 $7\frac{1}{2}$	$4\frac{1}{2}$		α Lyræ.
			17 31—	4 10 $17\frac{1}{2}$	19 $4\frac{3}{8}$		♀ 2 L.
☉	18	44 28—:		5 46 $24\frac{1}{2}$			☉ 1 L. } flying clouds.
			47 35—:	48 $23\frac{1}{2}$	49 $12\frac{1}{2}$		☉ 2 L. } flying clouds.
				12 45 30:			Polaris S. P.

TRANSITS compared with equal Altitudes, for finding the Error of the Meridian Mark.

		Transits of Sun at transit instrument.	Noon per equal altitudes.	Differences.
		h ′ ″	h ′ ″	″
June	3	4 45 9,3	4 45 5,1	4,2 W.
	11	5 18 9,9	5 18 7,3	2,6 W.
	15	5 34 43,9	5 34 42,5	1,4 W.
	18	5 47 13,0	5 47 10,3	2,7 W.
		Mean difference		2,7 West.

Hence it appears, that the Sun passed at the transit instrument too late 2″,7 by a mean of these observations, which shews the mark was west of the true meridian; which gives the azimuth of mark = 50″ south westerly.

TRANSIT of VENUS, observed at the NORTH CAPE.

1769

♄ June 3 At $13^h\ 46'\ 40''$ per clock, or $9^h\ 0'\ 2''$, apparent time, the Sun came out from under a cloud, with Venus on it, about $\frac{1}{4}$th of her diameter; and at $14^h\ 0'\ 41''$ or $9^h\ 14'\ 1''$, apparent time, Venus's outer limb seemed to be in contact with the Sun's limb; but no light of that part of the Sun's limb could be seen, Venus being apparently joined to the Sun's limb by a black ligament, which gradually diminished in breadth; and at $14^h\ 1'\ 36''$, or $9^h\ 14'\ 56''$, the Sun's light broke through it, and Venus and the Sun were to appearance perfect (this was certain to about 10 or 15 seconds of time), and the black ligament contracted itself, so that Venus was considerably within the Sun's limb, suppose $\frac{1}{20}$th of her diameter.

During these observations the air was red and hazy, and the Sun's limb very tremulous, and the spots in the Sun very indistinct, and Venus seemed very ill defined when on the Sun. But a better idea will be formed of the bad appearance of Venus at the internal contact, owing to the very hazy state of the air, from the representation of it, plate XIII.

Here follow some measures I was able to take during the time the clouds were off the Sun.

Time per clock.	App. time.	Measures of microm. in inches, &c.	Measures of microm. in degrees, &c.

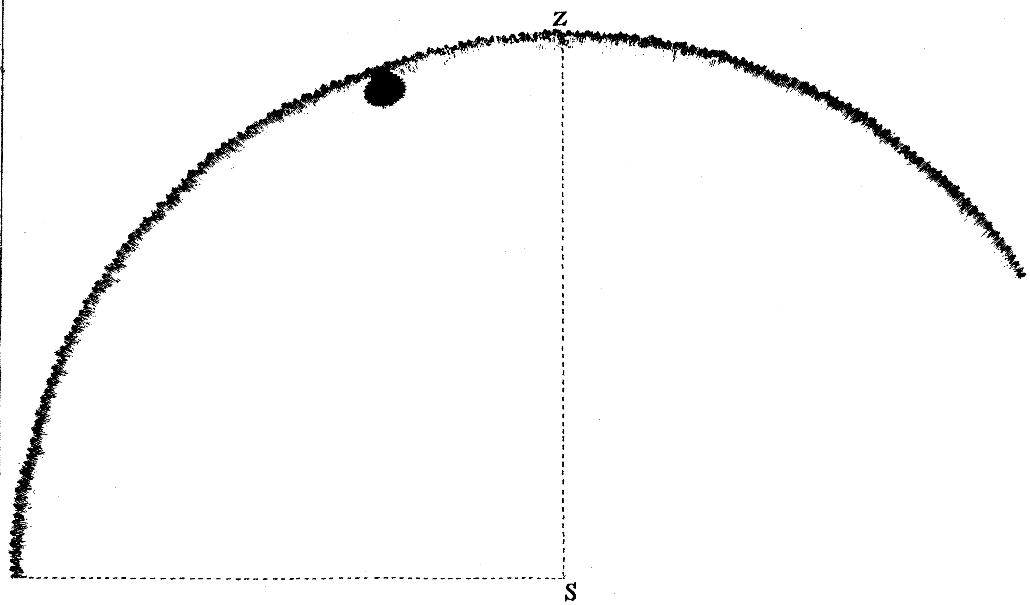
Soon after the internal contact, measures of Venus's diameter.

		0,1 24	
		0,1 23 +	
		0,1 23 —	
		0,1 22 +	
		0,1 22	
		0,1 22	
		0,1 23 —	
		0,1 24 —	
		0,1 23 —	
		0,1 23	
		0,1 23 —	
		0,1 23 —	
Mean of	= 12	0,1 22,8	= 55″,32

Measures of the Sun's horizontal and vertical diameters, taken immediately after Venus's diameter.

	Horizontal Diameter.		Vertical Diameter.	
	$4,9\frac{1}{2}$ $21\frac{1}{2}$		$4,8\frac{1}{2}$ 12	
	$4,9\frac{1}{2}$ 23		$4,8\frac{1}{2}$ 10	
	$4,9\frac{1}{2}$ 23		$4,8\frac{1}{2}$ 11	
	$4,9\frac{1}{2}$ $21\frac{1}{2}$		$4,8\frac{1}{2}$ 9	
Mean	$4,9\frac{1}{2}$ 22,2	31′ 37″,61	$4,8\frac{1}{2}$ 10,5	30′ 50″,73

Difference



J. Mynde sc.

Difference of Declinations of the North Limbs of the Sun and Venus.

Time per clock. h	'	"	App. time. h	'	"	Meaſures of microm. in inches, &c.		Meaſures of microm. in degrees, &c. '	"
14	38	37	9	51	50	0,5½	1	3	29,7
	44	30		57	32	0,5½	9	3	35,8
	46	56	10	0	8	0,5½	13	3	38,8
	52	45		5	56	0,5½	23	3	46,4

Difference of Declination of the South Limbs of the Sun and Venus.

14	54	50	10	8	1	4,2½	5	26	58,6
	57	43		10	53	4,2½	0	26	54,8
	59	52		13	2	4,2	20	26	51,0
15	2	0		15	9	4,2	16	26	48,0

Equatoreal Diſtances of the Weſtern Limbs of the Sun and Venus.

15	8	5	10	21	13	3,1	17	19	50,8
	10	28		23	36	3,1	2	19	39,4
	12	15		25	23	3,0½	20	19	34,1
	13	48		26	56	3,0½	12	19	27,9

Equatoreal Diſtances of the Eaſtern Limbs of Venus and the Sun.

15	15	50	10	28	57	6,8½	8½	11	49,4
	17	38		30	45	1,8½	20	11	58,1
	19	33		32	40	1,9	8	12	8,0
	22	0		35	6	1,9	19	12	16,4
	24	5		37	11	1,9½	7	12	26,2

Greateſt and leaſt Diſtances of Venus's neareſt Limbs from the Sun's Limbs, for finding the neareſt Diſtance of their Centers.

15	49	3	11	2	4	0,6½	17	4	19,9
	51	22		4	23	4,0	2+	25	21,3
	54	24		7	25	0,7	7	4	31,3
	58	1		11	1	3,9½	10	25	8,4
16	0	40		13	39	3,9½	7	25	6,1
	4	4		17	3	0,7	23	4	43,4
	6	24		19	22	0,7½	5	4	48,8
	9	55		23	53	3,9	14	24	52,5
	16	29		29	26	0,7	12	4	35,1
	21	31		34	27	0,7	8	4	32,1
16	25	55	11	38	51	3,8½	20::	24	38,0::

A Table for reducing the Scale of the micrometer to Degrees, &c.

Inches.	Value. '	"	Tenths.	Value. '	"	Vernier.	Value. "
1	6	19,95	1	0	37,99	1	0,76
2	12	39,91	2	1	15,99	2	1,52
3	18	59,86	3	1	53,98	3	2,28
4	25	19,81	4	2	31,98	4	3,04
5	31	39,77	5	3	9,97	5	3,80
			6	3	47,97	6	4,56
			7	4	25,97	7	5,32
			8	5	3,96	8	6,08
			9	5	41,96	9	6,84
						10	7,60
						11	8,36
						12	9,12
						13	9,88
						14	10,64
						15	11,4[illegible]
						16	12,16
						17	12,92
						18	13,68
						19	14,44
						20	15,20
						21	15,96
						22	16,72
						23	17,48
						24	18,24
						25	18,99

On examination, the micrometer ſcale wanted no adjuſtment.

ECLIPSE of the SUN, observed at the NORTH CAPE.

1769
June 3 At $1^h\ 48'\ 4''$, the clouds clearing away, I saw the Sun, and the Moon had made a small impression or notch in the Sun's limb; by observing the increase of the eclipse, I suppose it began 4, 5, or 6 seconds sooner than I first saw it, or at $1^h\ 48''\ 0''$ per clock, or $20^h\ 59'\ 19''$ apparent time, nearly.

Distances of the Cusps.

Time p clock	App. time	Measures	Reduced
h ′ ″	h ′ ″		′ ″
2 10 22	21 21 0	3,7 5	23 29,6
13 19	24 34	3,8½ 9	24 29,6
19 1	30 15	4,1½ 6	26 21,3
21 3	32 16	4,2 7	26 41,1
23 50	35 3	4,3½ 8	27 38,8
27 38	38 50	4,4½ 14	28 21,4
31 10	41 21	4,5½ 10	28 56,4
34 56	46 7	4,6 13	29 17,7
36 4	47 14	4,6½ 15:	29 38,2
39 11	50 21	4,7 0	29 45,8

Sun's horizontal Diameter, measured directly after the Eclipse ended.

4,9½ 21½
4,9½ 20
4,9½ 20
4,9½ 22+
4,9½ 21—

Mean 4,9½ 20,9 = 31′ 35″,9

Measures of the lucid Part, near the Middle of the Eclipse.

2 43 7	21 54 16	1,1 5	7 1,7
44 11	55 20	0,9½ 22	6 17,7
47 50	58 59	0,9 24	6 0,2
49 35	22 0 43	0,9 9	5 48,4
52 14	3 22	1,0½ 11	6 47,3

By comparing the end with Mr. Maskelyne's observation at Greenwich, the difference of meridians comes out $1^h\ 44'\ 6''$ of time. = $26^\circ\ 1'\ 30''$ east, or difference of longitude of my observatory from Greenwich to the east. From whence the longitude of the point called the North Cape is $25^\circ\ 49'$ east of Greenwich.

Distances of the Cusps.

2 54 55	22 6 2	4,6½ 19	29 41,2
57 1	8 8	4,7 3	29 48,1
59 55	11 2	4,6 14	29 18,4
3 2 24	13 30	4,6 10	29 15,4
4 31	15 37	4,6 7	29 13,1
6 37	17 42	4,5½ 9	28 55,6
8 13	19 18	4,5 20	28 45,0
10 34	21 38	4,4½ 18	28 24,5
14 57	22 26 1	4,3 17	27 26,7

Clouds came on, so that I saw the Sun no more till $3^h\ 38'\ 0''$ per clock, and it broke away very clear, and continued clear to the end, which was at $3^h\ 48'\ 19''$ per clock, or $22^h\ 59'\ 17''$ apparent time. The air being very clear, the end seemed certain to about two seconds.

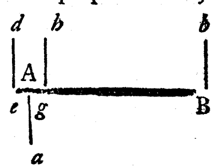
The telescope used was a reflector of 2 feet focus, made by Mr. Dollond; and the magnifying power, applied for the ingress of Venus, and the beginning and end of the solar eclipse, was 100. The magnifying power used with the micrometer, was 50.

Adjustments of the telescope with the different eye-pieces and little speculums, as combined together when used. N. B. — shews that (o) on the vernier, is behind, or to the left hand of the first division on the scale; and + to the right hand, or before.

Long eye-piece and short focus little speculum magnifying 100 times = — o + $11\frac{1}{2}$ on vernier.
Long eye-piece and long focus little speculum with micrometer on = — o + $19\frac{2}{3}$ on vernier
The eye-piece with moveable wires, and long focus little speculum, and micrometer = + o + 4 on vernier.
These are a mean of 10 or 12 observations each.

The Value of the Scale of the Object Glass Micrometer was found as follows:

A base of 120 feet was carefully measured on level ice (which was covered with frozen snow about half an inch thick), with two 10 feet fir rods; and the measure being taken four different times, no one differed from any of the others so much as $\frac{1}{10}$th of an inch. But as the fir rods might not consist of 10 feet exactly of the same standard from which the micrometer scale was laid off, I therefore took six inches between the fine points of a pair of compasses, from the micrometer scale; and, by repeating this measure, found the exact length of the fir rods in measures of the micrometer scale; and thence corrected the length of the base, found immediately by the rods, and reduced to the standard of the micrometer scale. Perpendicularly over the base, at one end, was placed the center of the divided object glass, and perpendicularly over the base, at the other end, a board was placed, having its plane at right angles with the base line, white paper pasted on its upper part; and at the height of the center of the object glass, nearly above the horizon, was a strong black line drawn, as A B = 8 inches, A *g* and A *e* being small but equal distances from A; by bringing (*e d* and *g b*) to coincide alternately with (A *a*) the error of adjustment of the micrometer scale was found; and by separating the glasses till (A *a*) and (B *b*) made but one line; from this separation the value of one extent of the micrometer scale was found, by making this proportion. As the length of the base : is to the length (A B) :: so is 206265″ (the number of seconds in an arch equal to the radius of a circle) to a fourth number, which will be the seconds of the angle measured by that opening of the glasses, which is shewn by the micrometer scale; and other angles will be in direct proportion to the respective measures whence the table was formed.



ZENITH DISTANCES taken with an Astronomical Quadrant, of one Foot Radius, made by Mr. Bird, at the NORTH CAPE of EUROPE.

1769	Bar. Inches.	Ther. out °	Ther. in °		Interior arch °	′	″	Exterior arch °	′	″	″	Exterior arch reduced °	′	″
☉ May 14	29,80	43	40	☉ U. L. on the merid.	51	59	10	55	1	26	15	51	58	59,2
20	29,71	45	41	☉ L. L. ditto	51	10	40,0	54	2	12	8	51	10	45,9
♄ June 3	29,93	66	58	☉ L. L.	48	52	44,0	52	0	18	16	48	52	36,6
				☉ U. L.	48	20	54,0	51	2	9	0	48	20	49,8
11	29,57	46	42	☉ L. L.				51	1	11	12	48	7	26,7
				☉ U. L.	47	35	37,0	50	3	3	0	47	35	40,3
15	29,66	41	40	☉ U. L.				50	2	5	8	47	22	41,3
				☉ L. L.	47	54	27,8	51	0	13	14	47	54	33,8
16	29,70	44	39	♀ Center	52	13	36+	55	2	27	17	52	13	27,4
17	29,72	44	42	☉ L. L.	47	50	28,0	51	0	4	0	47	50	30,5
				☉ U. L.	47	18	50,0	50	1	28	10	47	18	42,0
	29,71	47	$48\frac{1}{2}$	Arcturus	50	36	8,0	53	3	30	[illegible]	50	36	21,2
	29,70	52	$51\frac{1}{2}$	☉ L. L. } on the north				91	1	12	24	85	37	41,1
				☉ U. L. } meridian.	85	7	29+	90	3	6	[illegible]	85	7	19,4
	29,70	52	$51\frac{1}{2}$	α Lyræ	32	25	18+	34	2	11	[illegible]	32	25	22,0
	29,18	52	$54\frac{1}{2}$	♀ Center	52	27	0,0	55	3	25	[illegible]	52	26	55,4

From

From the foregoing Zenith Distances of the Sun, and of Arcturus, and α Lyræ, the Latitude of the Observatory is determined, as follows:

1769		From	Latitude °	′	″
May	14	⊙ U. L.	71	0	43,2
	20	⊙ L. L.	71	1	0,1
June	3	⊙ Center	71	0	43,5
	11	⊙ Center	71	0	39,8
	15	⊙ Center	71	0	39,7
	17	⊙ Center	71	0	40,6
		Arcturus	71	1	0,9
		α Lyræ	71	0	48,6
		Mean - - - -	71	0	47,0

From whence the latitude of the point of land called the North Cape is 71° 10′ north.

By a great many trials with a very good compass, of Dr. Knight's construction, I found the variation to be 6 degrees west; and by a dipping needle, I found, by repeated trials, the dip of the north end of the needle to be 79 degrees.

May 15, at $13^h\frac{1}{4}$ P. M. apparent time, or $1^h 7'$ after high water, by a mean of 7 observations, I found the dip of the horizon of the sea, from the observatory, to be 12′ 18″. Height of the barometer 29,70 inches; thermometer, without, 24°; thermometer, within, 28°. And May 20, at $7^h\frac{3}{4}$ P. M. apparent time, or $7^h 33'$ after high water, from a mean of 8 observations, I found the dip = 12′ 25″,5; barometer 29,70 inches; thermometer, without, 43°, and, within, 40°. Both these observations were made on the N. N. E. point of the true compass. During each of these observations the water was very smooth, and the horizon clear.——I found it was high water, at the full and change of the Moon, at $3^h 44'$ P. M. apparent time, at the Cape; and, by a series of observations, I found the water to rise 8 feet 1 inch, nearly, perpendicular at the spring tides; and at neap tides 6 feet 8 inches, perpendicular; and the tides seemed to follow very regular, as they ought to do when not disturbed by bad weather——June 8, I found the height of the observatory 140 feet 6 inches above low water mark.

A JOURNAL of the Barometer and two Thermometers, during the Time I was on Shore in the Island of MAGGERŒ, or NORTH CAPE, viz. from the 1st of May to the 21st of June.

		At noon. Bar.	Ther. out	Ther. in
1769		Inches	°	°
May	1	29,72	19	24
	2	29,68	26	28
	3	29 90	18	22
	4	29,96	28	31½
	5	29,92	34	32
	6	29,91	58	38
	7	29,74	60	40
	8	29,84	56	39

		At noon.			At midnight.		
		Bar.	Ther.		Bar.	Ther.	
			out	in		out	in doors
1769		Inches	°	°	Inches	°	°
May	9	29,90	47	36			
	10	29,97	46	39	29,98	34	36
	11	29,97	39	34	29,96	30	32
	12	29,97	30	31	29,97	27	29
	13	30,03	42	36	30,04	34	37
	14	29,80	43	40	29,74	33	37½
	15	29,73	41	37	29,70	28	30
	16	29,66	29	31	29,64	26	28
	17	29,62	51	42	29,60	39	43
	18	29,48	53	45	29,39	38	41
	19	29,34	51	47	29,57	40	40
	20	29,71	45	41½	29,77	37	41
	21	29,51	54½	47	29,46	37	39
	22	29,51	41	38	29,64	36	43
	23	29,77	40	37	29,78	36	36½
	24	29,65	44	41½	29,47	40	40
	25	29,42	52	45	29,71	44½	45
	26	29,77	44	45	29,78	40	42
	27	29,76	48	44	29,73	36	38
	28	29,70	44	36½	29,66	34	35
	29	29,47	38	33	29,51	38	40½
	30	29,61	50	43	29,61	52	50
	31	29,61	52	48	29,70	42	37
June	1	29,67	41	38	29,72	38	40
	2	29,92	54	50	29,90	48	52
	3	29,93	66	58	29,78	36	36½
	4	29,79	43	43	29,70	46	40
	5	29,77	61	55	29,69	47	49
	6	29,51	47	43	29,50	43	43
	7	29,83	43	47	29,90	42	44
	8	29,89	47	45	29,90	41	40
	9	29,84	49	47½	29,74	40	42
	10	29,67	48	42	29,66	41	43
	11	29,57	46	42	29,58	33	38
	12	29,48	38	35	29,51	31½	33
	13	29,56	38	34	29,52	35	34
	14	29,53	39	36	29,57	35	35½
	15	29,66	41	40	29,64	34	35
	16	29,51	38	38	29,62	38	37½
	17	29,72	44	42	29,70	52	51½
	18	29,18	52	54½	29,52	44	46
	19	29,42	37	39	29,38	36	38
	20	29,67	36	37	29,49	32	34
	21	29,54	36	38	29,60	31½	33
	22	29,46	35	37			

The thermometers were kept, the one in the obſervatory, and the other without, in the open air; but always in the ſhade; and were always obſerved at noon and midnight, after the 10th of May; but before, only at noon.

The INSTRUMENTS used at the NORTH CAPE, by Mr. BAYLY, were as follows:

A quadrant of 1 foot radius, and two thermometers, made by Mr. Bird.

A 2 feet reflector, with an achromatic object glass micrometer, by Mr. Dollond.

A transit instrument, of 4 feet, made by Mr. Bird; with an achromatic object glass, by Mr. Dollond.

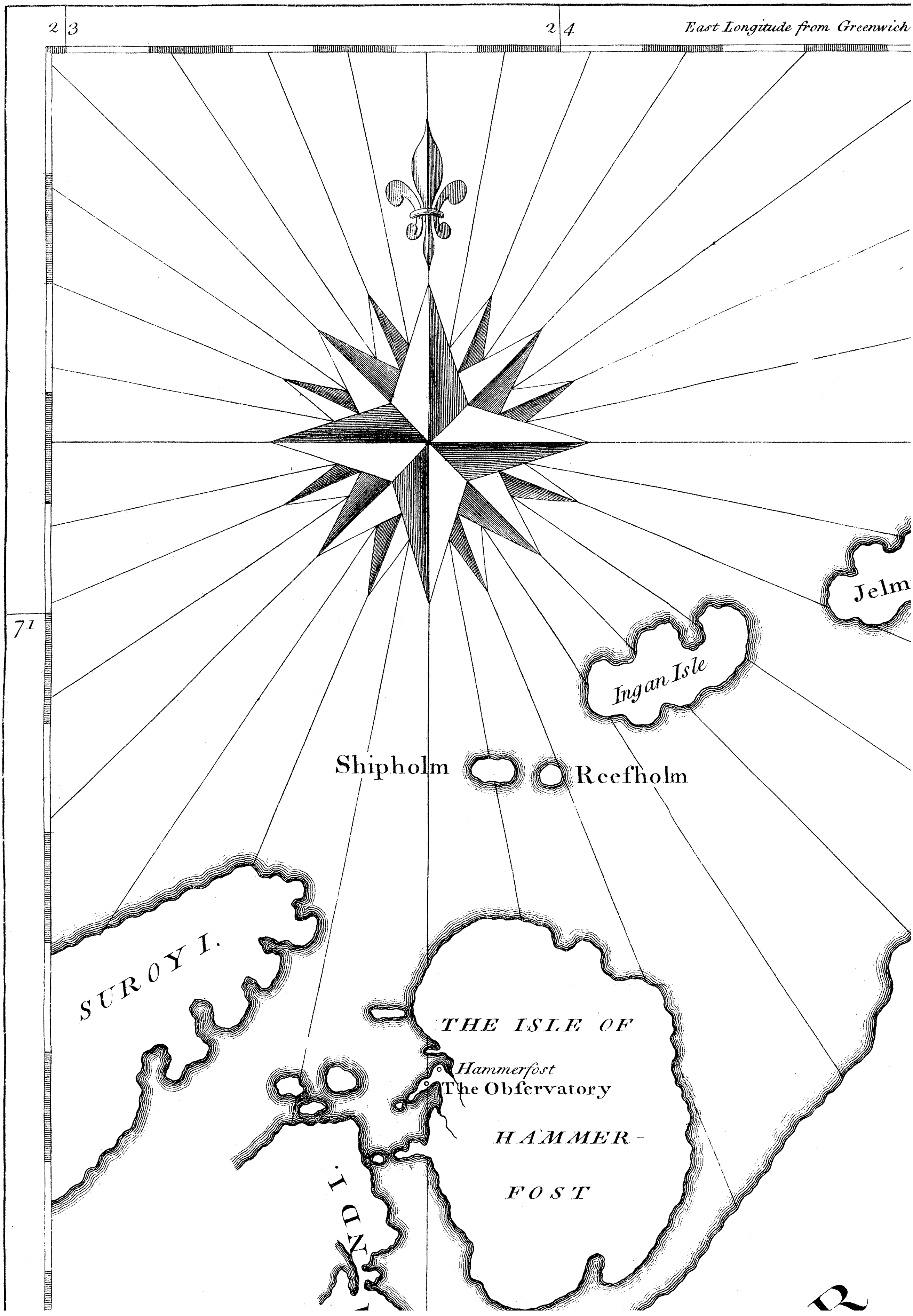
A barometer, by Mr. Ramsden.

An astronomical clock with a gridiron pendulum, a journeyman clock, and an alarum clock, by Mr. Shelton.

A dipping needle, belonging to the Royal Observatory, made by Mr. Graham.

A like set, exclusive of a dipping needle, was used by Mr. Dixon, at the island of Hammerfost.

N. B. The adjoining chart, and views of the sea-coast and islands, near the North Cape of Europe, Tab. XIV. were drawn from the joint observations of Messieurs Dixon and Bayly.



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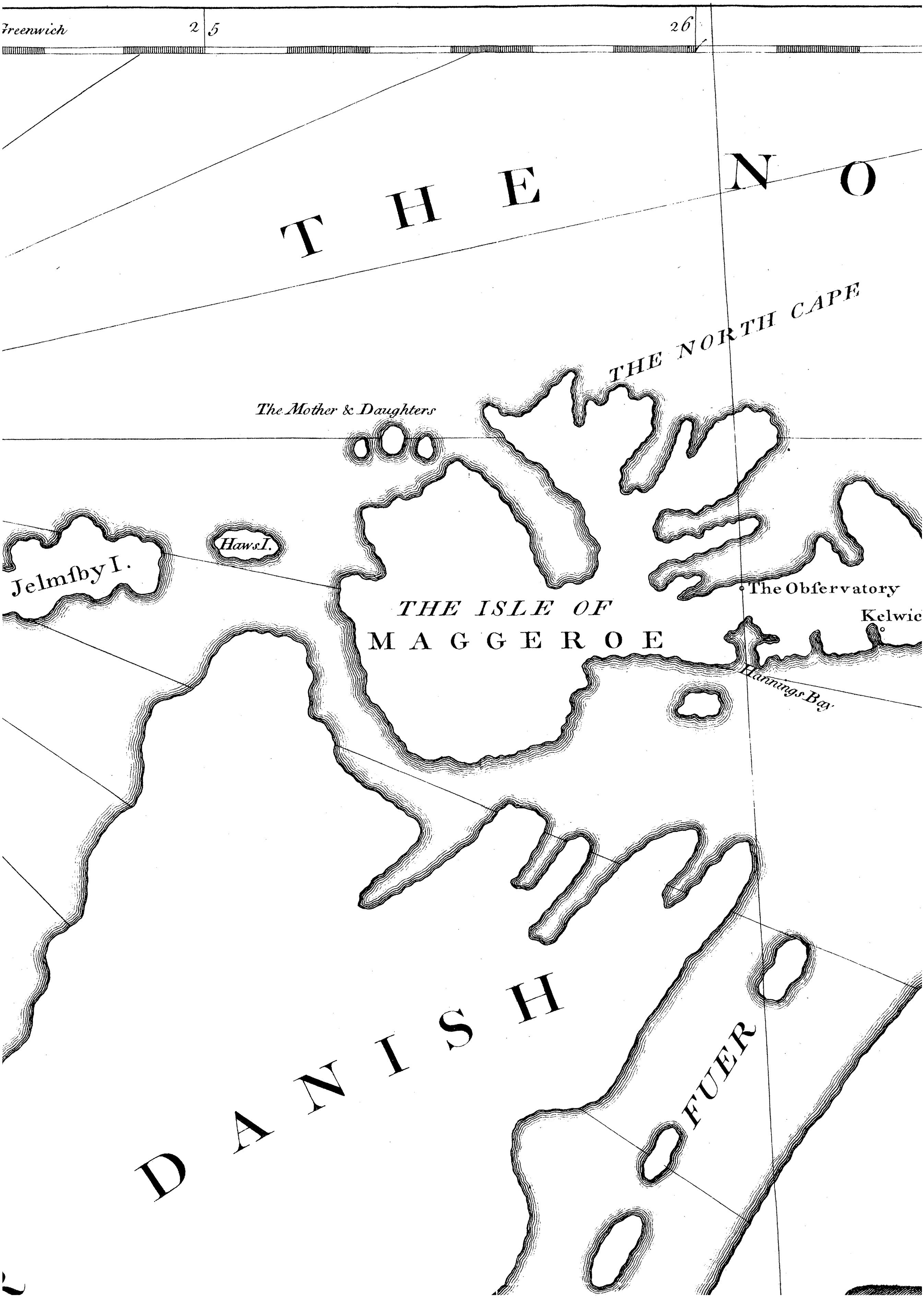
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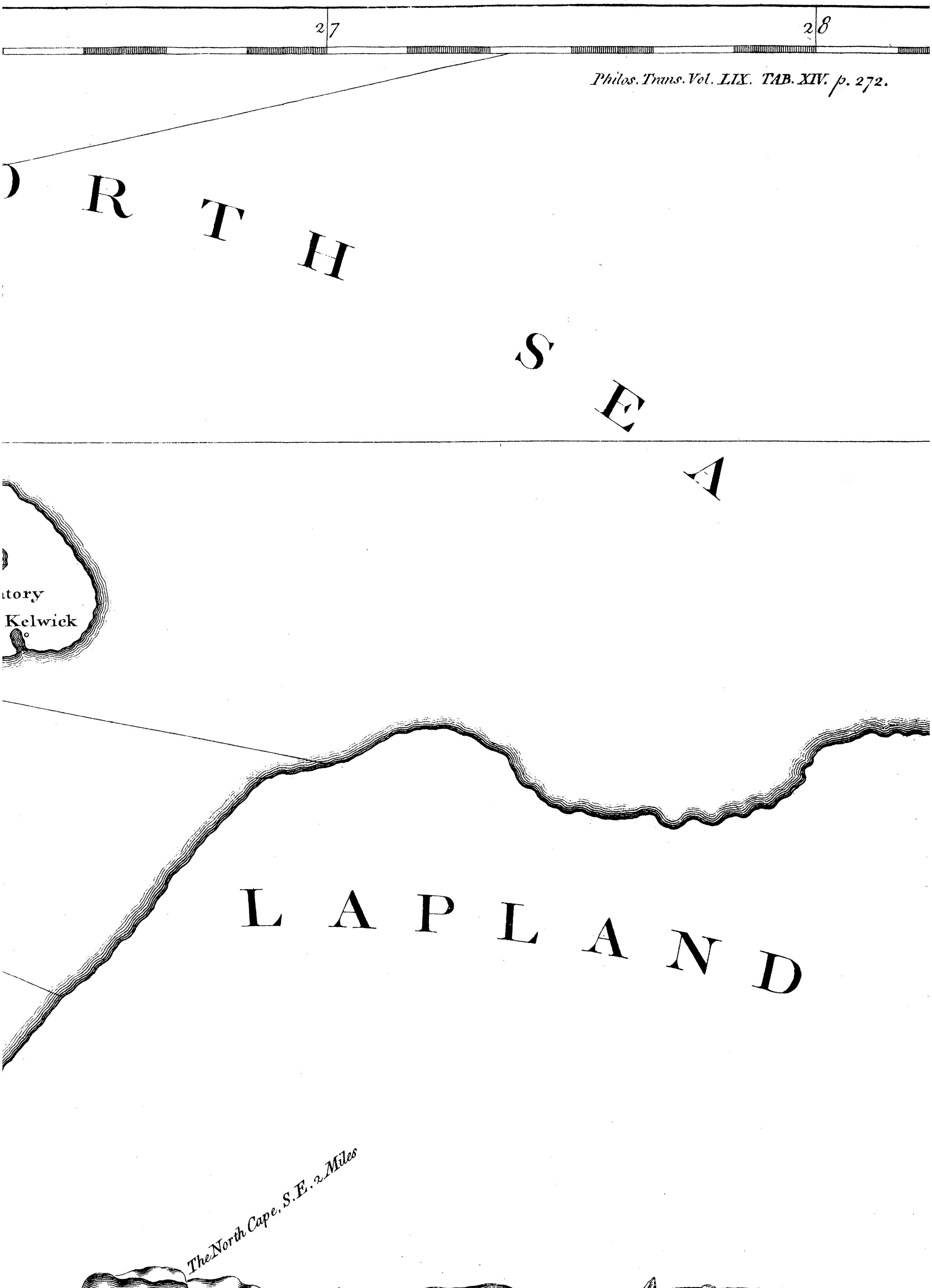
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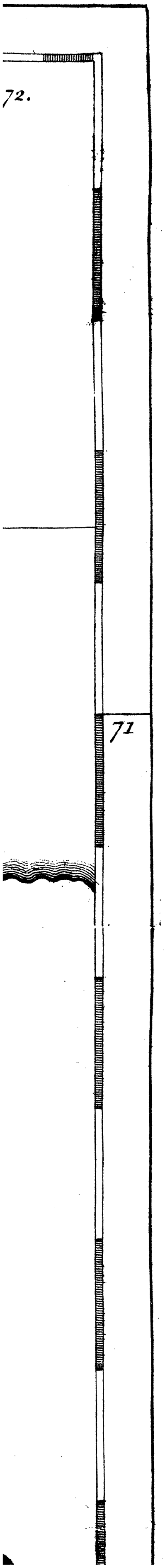
The North Cape, S.E. 2 Miles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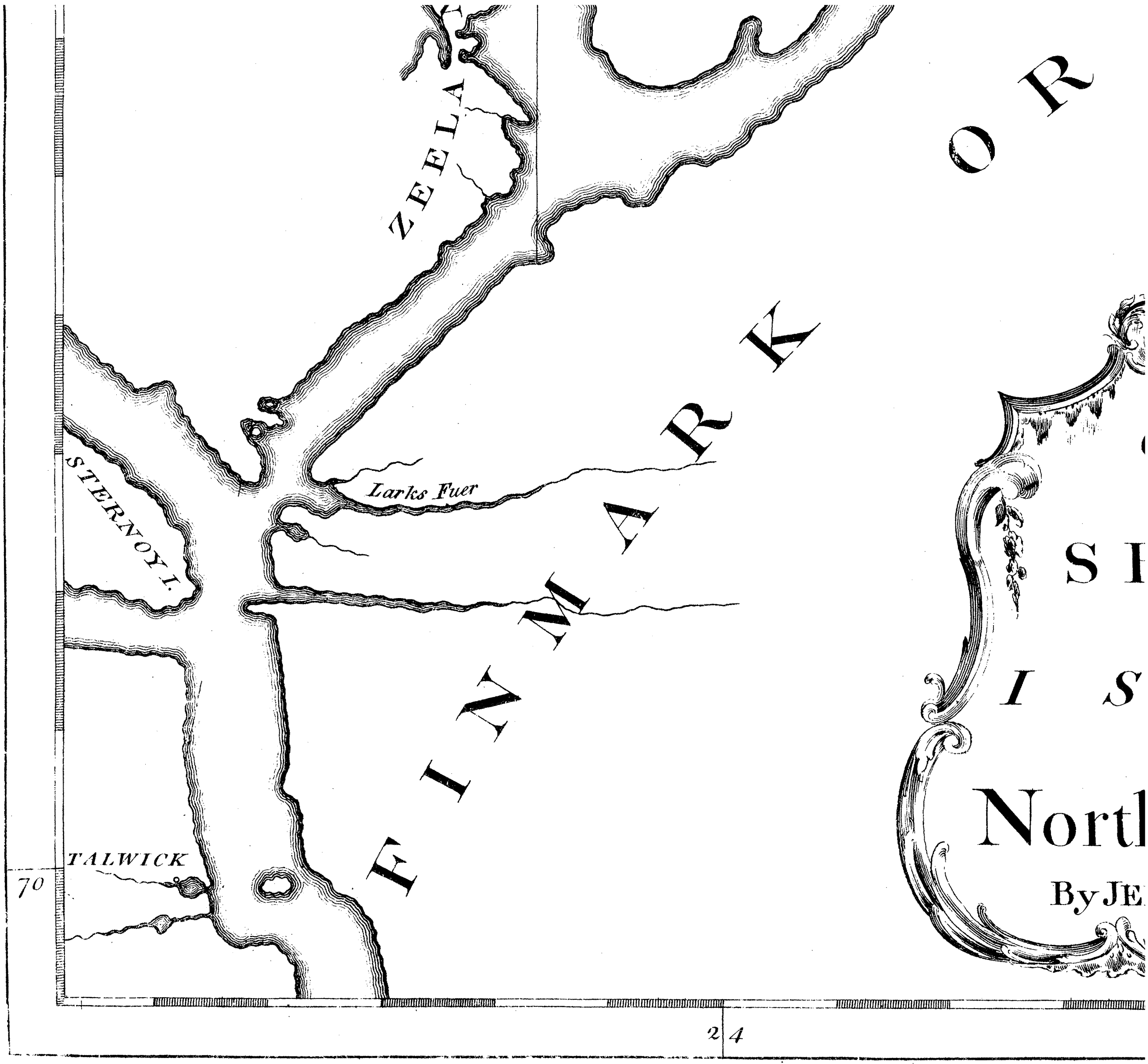

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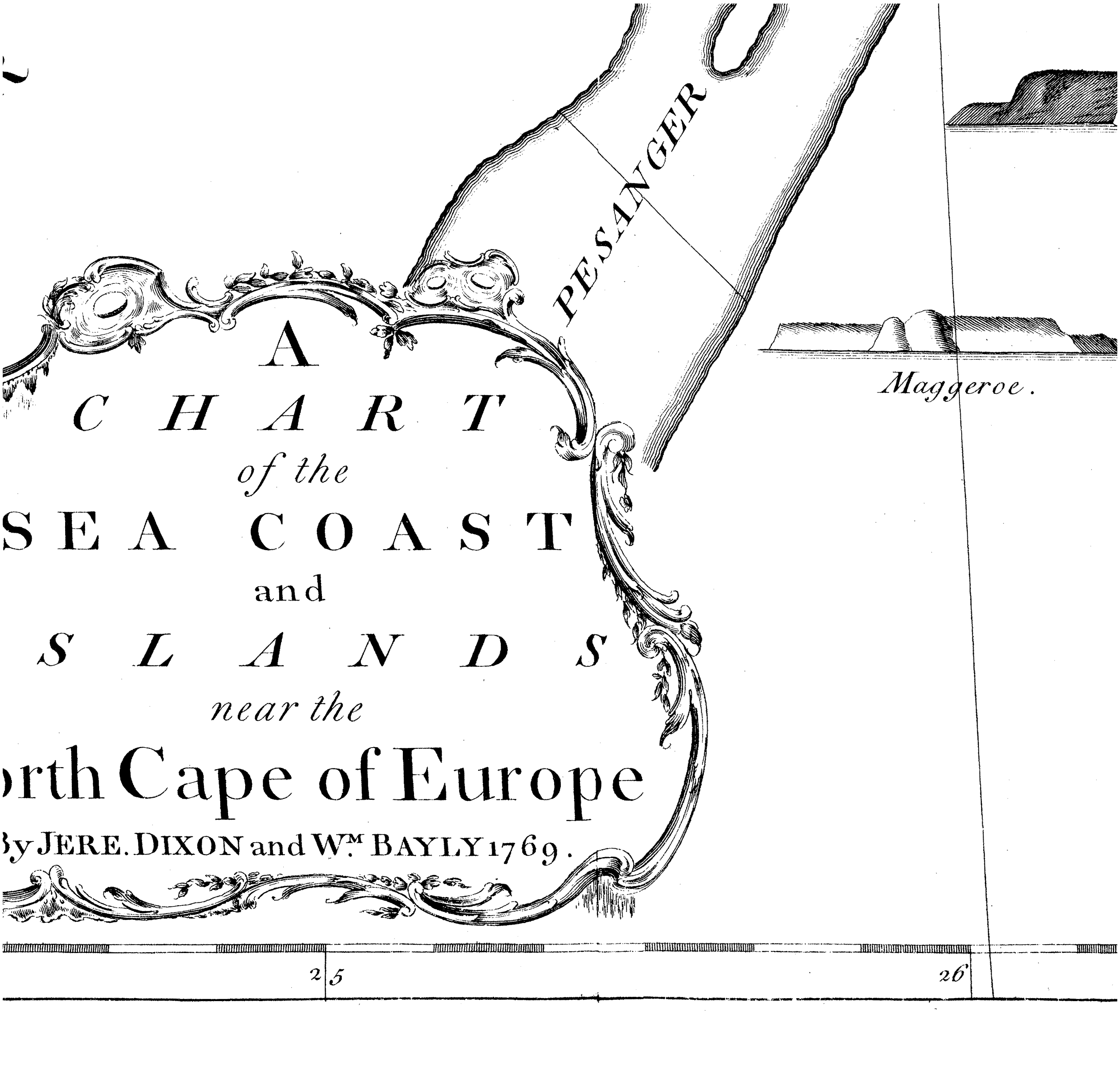
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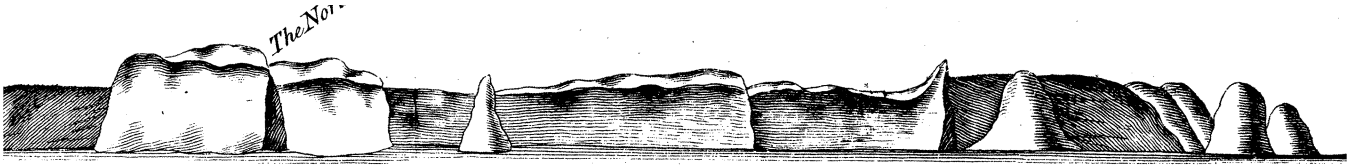
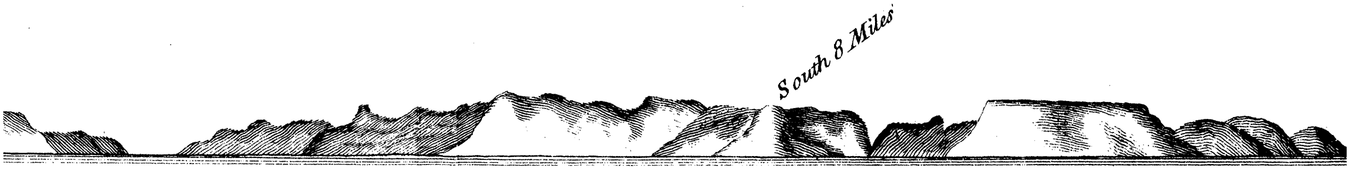


The Isle of Maggeroe.



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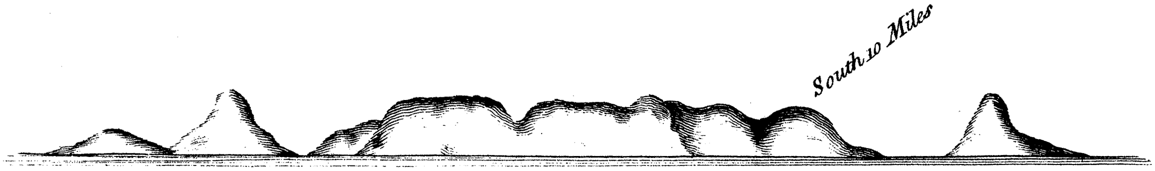

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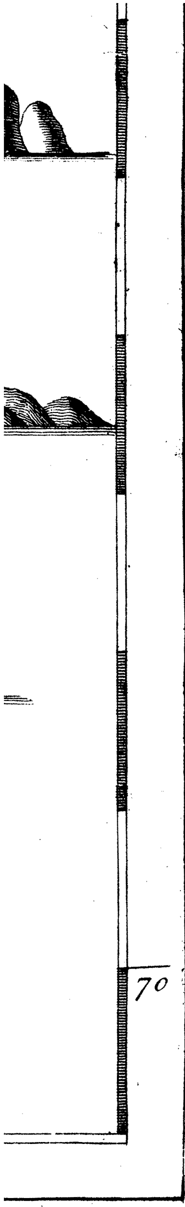
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